JENNIFER F. BIDDLE
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APPOINTMENTS

Mary A. S. Lighthipe Professor of Marine Studies, 2025-current
Professor, 2021-current
University of Delaware, College of Earth, Ocean and Environment, Lewes, DE
Associate Professor, 2017-2021
University of Delaware, College of Earth, Ocean and Environment, Lewes, DE
Assistant Professor, 2010-2017
University of Delaware, College of Earth, Ocean and Environment, Lewes, DE
Postdoctoral researcher, 2007-2009
Laboratory of Andreas Teske, Dept. of Marine Sciences, UNC Chapel Hill, NC
Postdoctoral researcher, 2006-2007
Laboratory of Christopher House, Dept. of Geosciences, Penn State University, PA
Graduate Research Fellow 2000-2006
Laboratory of Jean Brenchley, Dept. of Biochemistry, Penn State University, PA
Research Assistant, 1999-2000
Laboratory of S. Jane Flint, Dept. of Molecular Biology, Princeton University, NJ

PROFESSIONAL PREPARATION

Ph.D., 2006, Dept. of Biochemistry, Microbiology and Molecular Biology, The Pennsylvania State University
Dissertation: *Microbial populations and processes in subseafloor marine environments*
B.S. with honors, 1999, Biotechnology, Rutgers University

HONORS AND AWARDS

American Academy of Microbiology Fellow (2023)
Joanne Simpson Medal for the American Geophysical Union (2021)
American Geophysical Union Fellow (2021)
125th anniversary fellow, College of Earth and Mineral Sciences, Penn State University (2021)
College of Earth, Ocean and Environment Teaching Award (2019)
College of Earth, Ocean and Environment Mentoring Award (2018)
International Ocean Drilling Program Distinguished Lecturer (2013-2014)
NASA Postdoctoral Fellowship – National Astrobiology Institute (2007-2009)
Wedler Outstanding Doctoral Dissertation Award, Penn State BMB Department (2007)
Schlanger Ocean Drilling Program Fellowship, Joint Oceanographic Institutions (2003-2004)
NASA Space Grant Fellowship, Pennsylvania Space Grant Consortium (2002-2006)

PUBLICATIONS *Indicates Biddle lab member (student, postdoc, bioinformatician); preprint dates are listed separately.

(ISI ID: F-8323-2010, h-index=28, 1/25; Google scholar h-index=34, citations=8340 10/2025; ORCID 0000-0002-4344-8724)

1. Bowen, MR*, Agblemanyo FE, Persad PM*, Wozniak AS, and **Biddle JF**. 2025. Influence of Seasonal Succession on Microbiological and Physiochemical Composition in Shallow Estuarine Sediments. Environmental Microbiology 27, no. 10: e70194.
2. Yoshimura, K*, Tully BJ, Shah Walter S, **Biddle JF**. 2025. Highly Dynamic Archaeal and Bacterial Communities From the Surface to the Deep in the Atlantic Ocean. Environmental Microbiology Reports, accepted.
3. Wu, DG*, Harris CR*, Kalis KM*, Bowen M*, **Biddle JF**, Farag IF*. 2025. Comparative metagenomics of tropical reef fishes show conserved core gut functions across hosts and diets with diet-related functional enrichments. Applied and Environmental Microbiology. 91:e02229-24.
4. Bowen, M*, Main, C, Farag, IF*, **Biddle JF**. 2024. Identifying potential introduced and natural sources of pollution in Delaware watersheds. Applied and Environmental Microbiology. 90(12): e01958-24.
5. Guider, J, Yoshimura, K*, Block, K, **Biddle JF,** Shah Walter S. 2024. Archaeal Blooms and Busts in an Estuarine Time Series. Environmental Microbiology Reports. 26 (2): e16584.
6. Capooci, M, Seyfferth AL, Tobias C, Wozniak AS, Hedgpeth A, Bowen, M*, **Biddle JF**, McFarlane KJ, Vargas, R. 2023. High methane concentrations in tidal salt marsh soils: Where does the methane go? Global Change Biology 30: 1: e17050
7. Hudson, JE, Levia DF, Yoshimura KM*, Gottel NR, Hudson SA, **Biddle JF**. 2023. Mapping bark bacteria: initial insights of stemflow-induced changes in bark surface phyla. Microbiology Spectrum e03562-23
8. Bowen, M*, Farag IF*, Main C, **Biddle JF**. 2023. Reference library for microbial source tracking in the mid-Atlantic United States. Microbial Resource Announcements e00674-23
9. Zhao, R*, Farag IF*, Jørgensen SL, **Biddle JF**. 2022. Occurrence, diversity and genomes of Candidatus Patescibacteria along the early diagenesis of marine sediments. Applied and Environmental Microbiology. 88(24) e01409-22
10. R Zhao*, **JF Biddle**, SL Jørgensen. 2022. Introducing *Candidatus* Bathyanammoxibiaceae, a family of bacteria with the anammox potential present in both marine and terrestrial environments. ISME Communications 2:42
11. Zhao R*, **Biddle JF**. 2021. Helarchaeota and co-occurring sulfate reducing bacteria in subseafloor sediments from the Costa Rica Margin. ISME Communications 1:1-11 (BioRXiv published 2021)
12. Farag, IF*, Zhao R*, **Biddle JF**. 2021. "Sifarchaeota" a novel Asgard phylum capable of polysaccharide degradation and anaerobic methylotrophy. Applied and Environmental Microbiology, 97:e02584-20. (BioRXiv published 2020)
13. Beckmann, S*, Farag, IF*, Zhao, R*, Christman, GD*, Prouty, NG, **Biddle JF**. 2021. Expanding the repertoire of electron acceptors for the anaerobic oxidation of methane in authigenic carbonates in the Atlantic and Pacific Ocean. ISMEJ. https://doi.org/10.1038/s41396-021-00918-w (BioRXiv published 2019)

14. Fulweiler RW, Davies SW, **Biddle JF**, Burgin AJ, Cooperdock EHJ, Hanley TC, Kenkel C, Marcarelli AM, Matassa CM, Mayo TL, Santiago-Vazquez LZ, Traylor-Knowles N, Ziegler M. 2021. Rebuild the Academy: Strategies for supporting academic mothers during the COVID-19 Global Pandemic and Beyond. PLoS Biology 19(3): e3001100. (Preprint 2020)
15. R Zhao*, JM Mogollon, SS Abby, C Schleper, **JF Biddle**, D Roerdink, IH Thorseth, SL Jorgensen. 2020. Geochemical transition zone powering microbial growth in subsurface sediments. PNAS 117: 32617-32626 (BioRXiv published 2019)
16. Cockell, CS, McMahon S, **Biddle JF**. 2020. When is life a viable hypothesis?: the case of Venuisan phosphine. Astrobiology 21:1.
17. Leon-Zayas R*, McCargar M, Drew JA, **Biddle JF**. 2020. Microbiomes of fish, sediment and seagrass suggest connectivity of coral reef microbial populations. PeerJ: 8,e10026
18. Christman, GD*, Leon-Zayas R*, Summers ZM **Biddle, JF**. 2020. Methanogens within a high salinity oil reservoir from the Gulf of Mexico. Frontiers in Microbiology, 11:2303
19. Christman, GD*, Leon-Zayas R*, Summers ZM, **Biddle JF**. 2020. Novel clostridial lineages recovered from metagenomes of a hot oil reservoir. Scientific Reports, 10: 808.
20. Prouty NG, Campbell-Swarzenski PL, Close HG, **Biddle JF**, Beckmann S*. 2020. Molecular indicators of methane metabolism at cold seeps along the United States Atlantic Margin. Chemical Geology, 543: 119603.
21. Zhao, R*, Summers ZM, Christman GD*, Yoshimura KM*, **Biddle JF**. 2020. Metagenomic views of microbial dynamics influenced by hydrocarbon seepage in sediments of the Gulf of Mexico. Scientific Reports 10: 5772.
22. Farag IF *, **Biddle JF**, Zhao R *, Martino AJ, House CH, Leon-Zayas R *. 2020. Metabolic potentials of archaeal lineages resolved from metagenomes of deep Costa Rica sediments. ISMEJ https://doi.org/10.1038/s41396-020-0615-5 (BioRXiv published 2019)
23. Yoshimura KM *, Todorova S, **Biddle JF**. 2020. Mercury methylation and microbial diversity in meromictic Glacier Lake, Jamesville NY. Environmental microbiology Reports 12 (2): 195-202
24. Martino A, Rhodes ME, Leon-Zayas R*, Valente ID, **Biddle JF**, House CH. 2019. Microbial diversity in sub-seafloor sediments from the Costa Rica Margin. Geosciences 9(5): 218.
25. Payler SJ, **Biddle JF**, Sherwood Lollar B, Fox-Powell MG, Edwards, T, BT Ngwenya, S Paling, CS Cockell. 2019. An ionic limit to life in the deep subsurface. Frontiers in Microbiology 10:426.
26. Rambo IM*, A Marsh, **JF Biddle**. 2019. Cytosine methylation within marine sediment communities: potential epigenetic adaptation to the environment. Frontiers in Microbiology: 10: 1291. (BioRXiv published 2017)
27. Yoshimura K*, York J, **JF Biddle**. 2018. Impacts of salinity and oxygen on particle-associated microbial communities in the Broadkill River, Lewes DE. Frontiers in Marine Science 5: 100.
28. Seyler L, McGuinness LR, Gilbert JA, **Biddle JF**, Gong D, Kerkhof LJ. 2018. Discerning autotrophy, mixotrophy and heterotrophy in marine TACK archaea from the North Atlantic. FEMS Microbiology Ecology https://doi.org/10.1093/femsec/fiy014
29. Thompson, L Sanders JG, et al. 2017. A communal catalogue reveals Earth's multiscale microbial diversity. Nature. 551 (7681): 457-463.

30. Leon-Zayas R*, Peoples L, **Biddle JF**, Podell S, Novotny M, Cameron J, Lasken RS, Bartlett DH. 2017. The metabolic potential of the single cell genomes obtained from the Challenger Deep, Mariana Trench within the candidate superphylum Parcubacteria (OD1). Environmental Microbiology, 19(7): 2769-2784.
31. Plummer S, Plummer MA, Merkel PA, Hagen M, **Biddle JF**, Waidner L*. 2016. Using directed evolution to improve hydrogen production in chimeric hydrogenases from Clostridia species. Enzyme and Microbial Technology, Vol 93–94; 132–141
32. Payler S, **Biddle JF**, Coates A, Cousins C, Cross RE, Cullen DC, Downs MT, Direito SOL, Edwards T, Gray AL, Gunn M, Hansford GM, Harkness P, Holt J, Josset JL, Li X, Lees DS, Lim DSS, Mchugh M, Mcluckie D, Meehan E, Paling S, Souchon A, Yeoman L, Cockell CS. 2017. Planetary science and exploration in the deep subsurface: results from the MINAR program, Boulby Mine, UK. International Journal of Astrobiology doi:10.1017/S1473550416000045.
33. Russell JA*, León-Zayas R*, Wrighton K, **Biddle JF**. 2016. Deep subsurface life from North Pond: enrichment, isolation, characterization and genomes of heterotrophic bacteria. Frontiers in Microbiology 7:678.
34. Orsi WD*, Jørgensen BB, **Biddle JF**. 2016. Transcriptional analysis of sulfate reducing and chemolithoautotrophic sulfur oxidizing bacteria in the deep subseafloor. Environmental Microbiology Reports doi 10.1111/1758-2229.12387.
35. Dowell F, Cardman Z, Dasarathy S, Kellerman M, Lipp JS, Ruff SE, **Biddle JF**, McKay LJ, MacGregor BJ, Lloyd KG, Albert DA, Mendlovitz H, Hinrichs KU, Teske A. 2016. Microbial communities in methane and short chain alkane rich hydrothermal sediments of Guaymas Basin. Frontiers in Microbiology 7: 17.
36. Teske A, De Beer D, McKay LJ, Tivey MK, **Biddle** JF, Hoer D, Lloyd KG, Lever MA, Roy H, Albert DA, Mendlovitz H, MacGregor B. 2016. The Guaymas Basin hiking guide to hydrothermal mounds, chimneys and microbial mats: complex seafloor expressions of subsurface hydrothermal circulation. Frontiers in Microbiology 7: 75.
37. Gutierrez T, **Biddle JF**, Teske AP, Aitken M. 2015. Cultivation-dependent and cultivation-independent characterisation of hydrocarbon-degrading bacteria in Guaymas Basin sediments. Frontiers in Extreme Microbiology 6, 695.
38. Ruff SE, **Biddle JF**, Teske AP, Knittel K, Boetius A, Ramette A. 2015. Global dispersion and local diversification of the methane seep microbiome. Proceedings of the National Academy of Sciences USA 112 (13): 4015-4020.
39. Sivakumar P, Taleh LA, Fernandez A, Markushin Y, **Biddle JF**, Melikechi N. 2015. Detection and Classification of Live and Dead Escherichia coli by Laser-Induced Breakdown Spectroscopy. Astrobiology, 15(2): 144-153.
40. Chan O, Bugler-Lacap D, **Biddle JF**, Lim D, McKay C, Pointing S. 2014. Phylogenetic diversity of microbialite reef in a cold alkaline freshwater lake. Canadian Journal of Microbiology, 60, 1-8.
41. Lazar CS, **Biddle JF**, Meador TB, Blair N, Hinrichs KU, Teske AP. 2014. Environmental controls on the intragroup diversity of the uncultured benthic archaea of the Miscellaneous Crenarchaetoal Group lineage naturally enriched in anoxic sediments of the White Oak River Estuary (North Carolina). Environmental Microbiology DOI: 10.1111/1462-2920.12659.
42. Wilkins MJ, Daly RA, Mouser PJ, Trexler R, Sharma S, Cole DR, Wrighton KC, **Biddle JF**, Denis EH, Fredrickson JK, Kieft TL, Onstott TC, Peterson L, Pfiffner SM, Phelps TJ,

Shrenk MO. 2014. Trends and future challenges in sampling the deep terrestrial biosphere. Frontiers in Microbiology 5: 481.
43. Flood BE, Bailey JV, **Biddle JF**. 2014. Horizontal gene transfer and the rock record: comparative genomics of phylogenetically distant bacteria that induce wrinkle structure formation in modern sediments. Geobiology 12 (2), 119-132.
44. Russell JA*, Brady AL, Cardman Z, Slater GF, Lim DSS, **Biddle JF**. 2014. Prokaryote populations of extant microbialites along a depth gradient in Pavilion Lake, British Columbia, Canada. Geobiology, 12 (3), 250-264.
45. Orsi W*, Edgcomb VP, Christman G*, **Biddle JF**. 2013. Gene expression in the deep biosphere. Nature 499, 205-208.
46. Teske A, **Biddle JF**, Edgcomb VP, Schippers A. 2013. Deep subsurface microbiology: a guide to the research topic papers. Frontiers in Extreme Microbiology doi: 10.3389/fmicb.2013.00122.
47. Burgaud G, Woehlke S*, Redou V, Orsi W*, Beaudoin D, Barbier G, **Biddle JF**, Edgcomb V. 2013. Deciphering the presence and activity of fungal communities in marine sediments using a model estuarine system. Aquatic Microbial Ecology doi:10.3354/ame01638.
48. MacGregor BJ, **Biddle JF**, Harbort C, Matthysse AG, Teske A. 2013. Sulfide oxidation, nitrate respiration, carbon acquisition, and electron transport pathways suggested by the draft genome of a single orange Guaymas Basin Beggiatoa (Cand. Maribeggiatoa) sp. filament. Marine Genomics 11: 53-65.
49. Orcutt BN, LaRowe DE, **Biddle JF**, Colwell FS, Glazer BT, Reese BK, Kirkpatrick JB, Lapham LL, Mlls HJ, Sylvan JB, Wankel SD, Wheat CG. 2013. Microbial activity in the deep biosphere: progress and prospects. Frontiers in Extreme Microbiology doi: 10.3389/fmicb.2013.00189.
50. MacGregor BJ, **Biddle JF**, Teske A. 2013. Mobile elements in a single-filament orange Guaymas Basin Beggiatoa ("Candidatus Maribeggiatoa") sp. draft genome: Evidence for genetic exchange with Cyanobacteria. Applied and Environmental Microbiology 79: 3974-3895.
51. **JF Biddle**. 2013. Microbial eukaryotes: Extending observations North. Frontiers in Microbiology, 4:10. doi:10.3389/fmicb.2013.00010.
52. Orsi W*, **Biddle JF**, Edgcomb V. 2013. Deep Sequencing of Subseafloor Eukaryotic rRNA Reveals Active Fungi across Marine Subsurface Provinces. PloS One doi: 10.1371/journal.pone.0056335.
53. MacGregor BJ, **Biddle JF**, Siebert JR, StauntonE, Hegg EL, Matthysse AG, Teske A. 2013. Why orange Guaymas Basin Beggiatoa spp. are orange: Single-filament-genome-enabled identification of an abundant octaheme cytochrome with hydroxylamine oxidase, hydrazine oxidase and nitrite reductase activities. Applied and Environmental Microbiology 79:1183-1190.
54. McKay LJ, MacGregor BJ, **Biddle JF**, Albert DB, Mendlovitz HP, Hoer DR, Lipp JS, Lloyd KG, Teske A. 2012. Spatial heterogeneity and underlying geochemistry of phylogenetically diverse orange and white Beggiatoa mats in Guaymas Basin hydrothermal sediments. Deep Sea Research. 67:21-31.
55. Kubo K, Lloyd KG, **Biddle JF**, Amann R, Teske A, Knittel K. 2012. Archaea of the Miscellaneous Crenarchaeotal Group (MCG) are abundant, diverse, and widespread in marine sediments. ISME J. 6:1949-1965.

56. Martino AJ, Rhodes ME, **Biddle JF**, Brandt JD, Tomsho LP, House CH. 2012. Novel degenerate PCR method for whole-genome amplification applied to Peru Margin (ODP Leg 201) subsurface samples. Front. Microbio. 3:17. doi: 10.3389/fmicb.2012.00017.
57. **Biddle JF**, Sylvan JB, Brazelton WJ, Tully BJ, Edwards KJ, Moyer CL, Heidelberg JF, Nelson WC. 2012. Prospects for the study of evolution in the deep biosphere. Front. Microbio. 2:285. doi: 10.3389/fmicb.2011.00285.
58. **Biddle JF**, Cardman Z, Mendlovitz H, Albert DB, Lloyd KG, Boetius A, Teske A. 2011. Anaerobic oxidation of methane at different temperature regimes in Guaymas Basin hydrothermal sediments. ISME J 2011:1-14. doi:10.1038/ismej.2011.1-14.
59. **Biddle JF**, White JR, Teske AP, House CH. 2011. Metagenomics of the subsurface Brazos-Trinity Basin (IODP Site 1320): comparison with other sediment and pyrosequenced metagenomes. ISME J. 5:1038-1047. http://www.nature.com/doifinder/10.1038/ismej.2010.199
60. Edgcomb VP, Beaudoin D, Gast R, **Biddle JF**, Teske A. 2010. Marine subsurface eukaryotes: the fungal majority. Environmental Microbiology 13:172-183. doi:10.1111/j.1462-2920.2010.02318.x.
61. Lloyd KG, Albert DB, **Biddle JF**, Chanton JP, Pizarro O, Teske A. 2010. Spatial structure and activity of sedimentary microbial communities underlying a Beggiatoa spp. mat in a Gulf of Mexico hydrocarbon seep. PLoS ONE 5(1):e8738.
62. Lin Y-S, **Biddle JF**, Lipp JS, Orcutt BN, Holler T, Teske A, Hinrichs K-U. 2010. Effect of storage conditions on archaeal and bacterial communities in subsurface marine sediments. Geomicrobiology Journal. 27(3):261-272.
63. **Biddle JF**, Fitz-Gibbon S, Schuster SC, Brenchley JE, House CH. 2008. Metagenomic signatures of the Peru Margin subseafloor biosphere show a genetically distinct environment. Proceedings of the National Academy of Science (USA), 105(30) 10583-10588.
64. **Biddle JF**, Lipp JS, Lever MA, Lloyd KG, Søerensen KS, Anderson R, Fredricks HF, Elvert M, Kelly TJ, Schrag DP, Sogin ML, Brenchley JE, Teske A, House CH, Hinrichs K-U. 2006. Heterotrophic Archaea dominate sedimentary subsurface ecosystems off Peru. Proceedings of the National Academy of Science (USA) 103(10):3846-3851.
65. **Biddle JF**, House CH, Brenchley JE. 2005. Microbial stratification in deeply buried marine sediment reflects changes in sulfate/methane profiles. Geobiology, 3:287-295.
66. **Biddle JF**, House CH, Brenchley JE. 2005. Enrichment and cultivation of microorganisms from sediment from the slope of the Peru Trench (ODP Site 1230). In Jørgensen, B.B., D'Hondt, S.L., Miller, D.J. (Eds.), Proc. ODP, Sci. Results, 201. http://www-odp.tamu.edu/ publications/201_SR/107/107.htm.
67. Finnen RL, **Biddle JF**, Flint SJ. 2001. Truncation of the human adenovirus type 5 L4 33-kDa protein: Evidence for an essential role of the carboxy-terminus in the viral infectious cycle. Virology 289(2):388-399.

Book Chapters and Reports

1. Magnabosco C, **Biddle JF**, Cockell C, Jungbluth S, Twing K. 2019. Biogeography, Ecology, and Evolution of Deep Life. In B. Orcutt, I. Daniel, & R. Dasgupta (Eds.), *Deep Carbon: Past to Present* (pp. 524-555). Cambridge: Cambridge University Press.
2. Flood RD, Violante RA, Gorgas T, Schwarz E, Grutzner J, Uenzelmann-Neben G, Hernandez-Molina J, **Biddle JF**, St-Onge G. 2017. IODP workshop: developing

scientific drilling proposals for the Argentina Passive Volcanic Continential Margin (APVCM)-basin evolution, deep biosphere, hydrates, sediment dynamics and evolution. Scientific Drilling, Vol 22: 49

3. Teske A, **Biddle JF**, Lever MA. 2014. Genetic evidence of seafloor microbial communities. In: Developments in Marine Geology Vol 7: Earth and Life Processes Discovered from Subseafloor Environment, D. Coleman, ed. Elsevier.
4. Edgcomb VP, Orsi W*, **Biddle J**F. 2014. Fungi in the marine subsurface. In: Microbial Life of the Deep Biosphere, J. Kallmeyer ed., DeGruyter Publishing.
5. **Biddle JF**, Jungbluth SP, Lever MA, Rappe MS. 2014. Life in the oceanic crust. In: Microbial Life of the Deep Biosphere, J. Kallmeyer ed., DeGruyter Publishing.
6. Edgcomb VP, **Biddle JF.** 2012. *Microbial eukaryotes in the marine subsurface?* In: Cellular Origin, Life in Extreme Habitats and Astrobiology, Volume 21, edited by A.V. Altenbach, J.M. Bernhard and J. Seckback, Springer Science Business Media B.V.
7. **Biddle JF**. 2011. Metagenomics of the marine subsurface: The first glimpse from the Peru Margin, ODP Site 1229. In: Handbook of Molecular Microbial Ecology II. Edited by F.J. de Bruijn, Wiley Blackwell, New Jersey.
8. Teske A, **Biddle JF**. 2007. Analysis of deep subsurface microbial communities by functional genes and genomics. In: Links Between Geological Processes, Microbial Activities and Evolution of Life, edited by Y. Dilek, H. Furnes & K. Muehlenbachs, Springer Science B.V., Dordrecht, The Netherlands